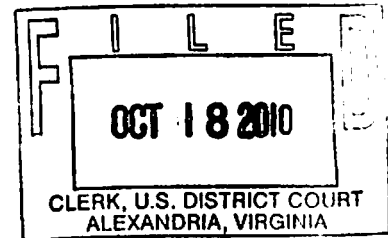


**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
Alexandria Division**



UNITED STATES OF AMERICA

v.

AJMAL A. AMAN,

Defendant.

No. 1:10cr236

MEMORANDUM OPINION

At issue in this arson prosecution is whether the proffered testimony of the government's three expert witnesses is admissible under Rule 702, Fed. R. Evid., and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Defendant Aman has moved to exclude (i) the testimony of Lt. George Robbins with respect to the origin and cause of the fire at Bridges Billiards & Grill ("Bridges"); (ii) the testimony of Charles Kubilus with respect to his fingerprint and palmprint analysis; and (iii) the testimony of Andrew Hawkins with respect to his forensic analysis of debris collected from Bridges. For the reasons that follow, this motion must be denied.¹

¹ Two hearings were held on this motion. The first was held following submissions of the parties' briefs. Because it became evident at oral argument that more information was needed from the government regarding each witness's expected testimony, the government was directed to file affidavits from each expert describing both the methodology the expert used in reaching his conclusion and his application of that methodology. The government complied, and defendant then filed a supplemental brief setting forth the specific objections to each expert. At the second hearing, oral argument was heard on the admissibility of each expert's testimony. The supplemental submissions and arguments of the parties were sufficient to permit a ruling on the defendant's motion to exclude Robbins, the fire investigator, and Hawkins, the forensic chemist, without the need for an evidentiary hearing. *See United States v. Aman*, No. 1:10cr236 (E.D. Va. Oct. 8, 2010) (Order). *See also United States v. Beasley*, 495 F.3d 142, 150 (4th Cir. 2007) (district court has discretion whether to hold a *Daubert* hearing prior to resolving a *Daubert* motion). Because the same could not be said with respect to the proffered fingerprint testimony, the government was required to present the testimony of Kubilus, the fingerprint expert, concerning the reliability of the methodology he employed and his application of that

I.

A brief factual recitation provides useful context for resolution of defendant's motion.²

On November 1, 2009, at approximately 3:30 a.m., the City of Fairfax Fire Department responded to a fire alarm signal from Bridges,³ a large commercial establishment that includes a restaurant, bar, pool tables, lounge, and dance club. Bridges is on the ground floor of a seven-story commercial office building. On arrival at the scene, the firefighters located the one remaining active fire and extinguished it. Thereafter, fire officials inspected the property and found two bottles of charcoal lighter fluid sitting on a hostess stand. Circa this time, defendant approached fire officials outside Bridges and explained that he had been inside Bridges when he discovered the fire. Fire-medics detected an odor of ignitable liquids on defendant, and one of the medics escorted defendant to the back of an ambulance for evaluation. Defendant explained that he had been alone in Bridges when the fire broke out, and that he left his keys and cell phone in a box that also contained lighter fluid.

Shortly thereafter, two assistant fire marshals arrived on the scene to investigate the cause of the fire. Upon meeting the defendant, both fire marshals smelled ignitable liquid on defendant's person. One fire marshal, Lt. David Whitacre, stayed with defendant while the other

methodology. The defendant, by counsel, then cross-examined Kubilus. Thereafter, at the conclusion of the hearing, the motion to exclude was denied as to Robbins and Hawkins, but the motion with respect to Kubilus was taken under advisement. *Id.* This memorandum opinion elucidates the reasons for the denial of the motion with respect to Robbins and Hawkins and resolves whether the motion should be granted with respect to Kubilus.

² The facts recited herein are derived from (i) the indictment; (ii) the hearings, including the testimony of Kubilus; and (iii) the parties submissions, including affidavits from the proffered expert witnesses.

³ At the second hearing on this motion, the government proffered that defendant ran to the fire station to report the fire. The manner in which the fire department was initially informed of the Bridges fire is immaterial to the present motion.

fire marshal, Captain Gary Orndoff, investigated the Bridges interior. Defendant told Whitacre that he had been handling ignitable fluids in Bridges, but intended to take the fluids home with him after leaving work. Defendant also stated that he had driven to work, but had left his keys inside his office in Bridges. Orndoff made numerous observations inside Bridges, including finding two bottles of charcoal lighter fluid on the bar and a cardboard box in defendant's office containing five plastic jugs, a bottle of lighter fluid, car keys, and a cell phone.

A short time later, three additional officials arrived from the Fairfax County Fire Marshal's Office to investigate the fire, including Robbins, one of the government's proffered expert witnesses. While inspecting the premises of Bridges, Robbins observed irregular burn patterns on the wooden dance floor, as well as a charred piece of baseboard separate from the burn patterns on the floor. The office also contained heavy fire damage separate and distinct from both the baseboard charring and the burn pattern on the dance floor. Robbins oversaw the layering of the office, which revealed two books of matches, a partially burned black shirt that reeked of an ignitable liquid, and the bottom half of a water bottle that had been partially melted. The half-bottle contained a liquid that smelled like gasoline.

Defendant was arrested later that same morning and charged with arson. A later search of defendant's vehicle, which was located in an open parking lot near Bridges, revealed a bottle of lighter fluid, a pair of scissors, and the top half of a water bottle that was consistent in shape and size with the bottom half of the bottle recovered from the office at Bridges.⁴

II.

The standards governing the admissibility of expert testimony are well-recognized. Under Rule 702, Fed. R. Evid., an expert witness may present opinion testimony "if (1) the

⁴ For a more detailed recitation of the facts relating to the search of defendant's car and the evidence the search disclosed, *see* Hrg. Tr. on the Mot. to Suppress, Sept. 24, 2010.

testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.” Although the Supreme Court in *Daubert* recognized that testing, peer review, the existence of a known error rate or controlling standards, and the general acceptance of the relevant scientific community may establish that testimony is based on “reliable principles and methods,” the Supreme Court expressly cautioned that “[m]any factors will bear on the inquiry, and we do not presume to set out a definitive checklist or test,” emphasizing that “the inquiry envisioned by Rule 702 is . . . a flexible one.” *Daubert*, 509 U.S. at 593-94; *see also United States v. Crisp*, 324 F.3d 261, 265-66 (4th Cir. 2003). Importantly, the *Daubert* inquiry focuses on the reliability of the expert’s principles and methodology, rather than the conclusions generated.⁵ *See Daubert*, 509 U.S. at 595. Finally, it should be noted that “vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.” *Id.* at 596. And as always, the exercise of a district court’s gate-keeping role should not transform a *Daubert* hearing into a trial on the merits. *Pipitone v. Biomatrix, Inc.*, 288 F.3d 239, 250 (5th Cir. 2002). In this regard, courts have sensibly held that a district court has broad discretion in deciding how to resolve a *Daubert* challenge. In particular, a hearing is not necessary in all cases, as the submissions of the parties may provide a sufficient basis to determine if the proffered testimony is admissible. *See Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 142 (1999) (noting that a district court has “the same broad latitude when it decides *how* to determine [the]

⁵ While the focus of the *Daubert* analysis is on the expert’s methodology, that there are circumstances in which the expert’s conclusions may bear on the analysis. As the Supreme Court has recognized, a district court may exclude an expert under *Daubert* if “there is simply too great an analytical gap between the data and the opinion proffered.” *GE v. Joiner*, 522 U.S. 136, 146 (1997).

reliability [of expert testimony] as it enjoys in respect to its ultimate reliability determination”) (emphasis in original); *see also United States v. Beasley*, 495 F.3d 142, 150 (4th Cir. 2007) (holding that a district court’s decision on whether to hold a Daubert hearing is reviewed only for abuse of discretion).

III.

A. Testimony of George Robbins

The government has proffered that Lt. George Robbins will testify concerning the origin and cause of the fire at Bridges based on his expertise and experience as a fire investigator. In this connection, Robbins’ affidavit sets forth his qualifications as an expert in fire investigation and the methodology he used in investigating the Bridges fire. Defendant argues that Robbins’ testimony and his expert report are inadmissible because his investigation and conclusions do not reflect the use and application of a reliable methodology, as required by Rule 702, Fed. R. Evid., and *Daubert*.

Robbins has substantial education and experience in fire investigation. He received a bachelor of science in criminal justice with a minor in fire science from the University of Maryland. In 2006, he graduated from the Fairfax County Police Department’s Criminal Justice Academy. He has received additional training in fire dynamics and investigation of gas and electrical appliance fires. Since 2006, Robbins has been certified as a fire investigator and fire inspector by appropriate departments of the Commonwealth of Virginia. He has been further certified as a fire and explosion investigator by the National Association of Fire Investigators. His experience spans more than three hundred fire, arson, and explosives investigations. He is plainly a well-qualified and experienced fire investigator.

In conducting his fire investigation, Robbins relied on the National Fire Protection Agency’s Guide for Fire and Explosion Investigations (2008 ed.) (“NFPA 921”). NFPA 921 is a

three-hundred-page manual originally published in 1992 and updated periodically thereafter. As the manual itself explains, NFPA 921 was developed by the Technical Committee on Fire Investigations, which includes dozens of fire investigators from local, state, and national agencies. NFPA 921-2. As the list of committee members suggests, and as confirmed by Robbins' own testimony, NFPA 921 has been peer-reviewed and is generally accepted in the community of fire investigators. The fact that NFPA 921 has been widely disseminated in the field of fire investigation is important because, as the Supreme Court has noted, "submission to the scrutiny of the scientific community . . . increases the likelihood that substantive flaws in methodology will be detected." *Daubert*, 509 U.S. at 593.

The general methodology NFPA 921 recommends for investigating the cause of a fire is essentially the well-known "scientific method" of generating and testing hypotheses.⁶ This methodology consists of seven steps: (1) identify the problem; (2) define the problem; (3) collect data; (4) analyze the data; (5) develop a hypothesis; (6) test the hypothesis; and (7) following any repeated rounds of refining and testing the hypothesis, select the final conclusion. NFPA 921 § 4. NFPA 921 goes on to provide detailed explanations concerning how fires spread and how to identify original sources of a fire. For example, NFPA 921 notes that multiple, non-communicating fires are more likely to be incendiary—that is, intentional—fires because, quite logically, accidental fires do not ordinarily start simultaneously in multiples places. NFPA 921 § 22.2. The guide also requires an investigator to consider and to exclude nine specific non-arson causes for multiple, non-communicating fires before reaching a conclusion that the fire was incendiary. NFPA 921 also details how fire patterns, burn damage, and other evidence can help explain the cause and origin of a fire.

⁶ See *Daubert*, 509 U.S. at 593 ("Scientific methodology today is based on generating hypotheses and testing them to see if they can be falsified.")

Because the methodology described in NFPA 921 has been peer reviewed, is generally accepted in the field of fire investigation, and incorporates the classic scientific methodology of “generating hypotheses and testing them to see if they can be falsified,” *Daubert*, 509 U.S. at 593, the methodology is reliable within the meaning of Rule 702, Fed. R. Evid., and *Daubert*. While a known error rate is also a factor to be considered in a *Daubert* analysis, a known error rate is not strictly required under *Daubert*. 509 U.S. at 593-94 (emphasizing that the *Daubert* factors are not a “definitive checklist,” and that “the inquiry envisioned by Rule 702 is . . . a flexible one”). In all, analysis of the *Daubert* factors do not justify excluding Robbins’ methodology as unreliable.

The conclusion reached here—that NFPA 921 is sufficiently reliable to pass muster under *Daubert*—also finds support in the case law. Courts examining the reliability of NFPA 921 have recognized that the methodology is a “peer reviewed and generally accepted standard in the fire investigation community.” *Travelers Prop. & Cas. Corp. v. GE*, 150 F. Supp. 2d 360, 366 (D. Conn. 2001); see also *Royal Ins. Co. of Am. v. Joseph Daniel Constr., Inc.*, 208 F. Supp. 2d 423, 426 (S.D.N.Y. 2002) (finding the NFPA 921 standards sufficiently reliable under *Daubert*). Indeed, the Fourth Circuit affirmed the exclusion of a fire investigator’s conclusion where the investigator failed to follow NFPA 921 and rule out “all other reasonable origins and causes” of the fire. *Bryte v. Am. Household, Inc.*, 429 F.3d 469, 478 (4th Cir. 2005).

Defendant points out that in 2009, the National Research Council of the National Academy of Sciences published a report criticizing, among other forensic fields, arson investigation. See Nat’l Research Council, *Strengthening Forensic Science in the United States: A Path Forward*, at 173 (2009) (“NRC Report”) (noting, *inter alia*, that “much more research is needed on the natural variability of burn patterns and damage characteristics and how they are affected by the presence of various accelerants”). As an initial matter, the NRC Report does not

recommend barring fire investigators from offering opinions in court based on the use of the NFPA 921 methodology. Moreover, while an important contribution to the evaluation of numerous forensic fields, the report does not bind federal courts. In any event, although the NRC sensibly suggests that further development of the principles and methods of fire investigation would improve the precision of such experts' findings, the NRC's critique does not change the result that, for all of the reasons already stated, the NFPA 921 methodology is sufficiently reliable to withstand *Daubert* scrutiny. Accordingly, Robbins' testimony is admissible under *Daubert* and Rule 702, Fed. R. Evid., and defendant's various concerns about the NFPA 921 methodology and Robbins' application of it are properly reserved for cross-examination, and do not justify wholesale exclusion of Robbins' testimony. *See Daubert*, 509 U.S. at 596.

It remains to determine whether Robbins reliably applied the NFPA 921 methodology in this case. In this regard, Robbins' affidavit details the various steps he followed in his investigation. As a general matter, Robbins asserts that he followed NFPA 921 closely, including the seven-step process outlined *supra*. In examining the Bridges premises, Robbins noted burn patterns, soot stains, areas of significant damage, and most notably, odors of ignitable fluid—specifically, gasoline. He also collected objects and pieces of debris for later forensic analysis. Based on his observations of the scene, Robbins concluded that the fire at Bridges was the product of three separate, non-communicating fires. In the course of reaching this conclusion, Robbins, as NFPA 921 instructs, then eliminated all causes of non-communicating fires except incendiary fires. Accordingly, Robbins, consistent with the NFPA 921 guidance, concluded that the Bridges fire was incendiary—*i.e.*, not accidental. Specifically, he reported that the “fire originated within the office as a result of the direct application of an open flame device [such as a] match or lighter to an ignitable fluid.” Robbins Rpt. at 6.

Defendant criticizes this report in six respects.⁷ First, defendant argues that Robbins failed to identify adequately the origin of the fire and to rule out other causes. This argument is belied by Robbins' report and affidavit, where he methodically explains how he reached his conclusion by eliminating other causes of the fire, with particular focus on eliminating alternative causes of non-communicating fires to leave arson as the only reasonable explanation. For example, conduction and convection may lead to two seemingly non-communicating fires that, in actuality, have a common source. Robbins eliminated this as a possibility by, *inter alia*, noting the presence of combustible materials between the non-communicating fires that should have burned had conduction or convection allowed the fire to spread from one location to the other. Defendant also argues that Robbins' conclusions are inadequate because he identified two "points" of origin and one "area" of origin as to the three non-communicating fires. Yet, neither NFPA 921 nor the Robbins report and affidavit suggests that the failure to pinpoint the exact origin of a non-communicating fire contravenes the standard principles of fire investigation. This issue may be one for cross-examination, but it is not an obstacle to the admissibility of Robbins' testimony and conclusions.

Second, defendant argues that Robbins' conclusions are inadmissible because he failed to collect comparison samples. While NFPA 921 recommends taking comparison samples during a fire investigation, the guide further clarifies that these comparison samples are not always necessary. Essentially, comparison samples may help establish whether the finding of ignitable liquids in one location is a sign of arson or merely a reflection of the amount of ignitable fluid generally expected at that location. For example, the finding of oil in the walls of a structure

⁷ Defendant enumerates seven deficiencies in Robbins' analysis, but since the first and fourth arguments are essentially the same, it is appropriate to count the arguments as six.

after a fire might suggest arson, but if the walls enclose a mechanic's garage, the presence of the oil may be explained by a reason other than arson. Similarly, some products are petroleum-based, such as plastics and many types of carpet, and when these materials burn, they may decompose into chemicals that might reflect their petroleum base.

In this case, there was no reason for lighter fluid or gasoline to be present at Bridges, particularly in such high concentrations that fire officials detected the odor of gasoline even after the fire was extinguished. As such, Robbins concluded that comparison samples were not necessary. This conclusion is bolstered by the affidavit of Hawkins, the government's proffered forensic chemist, in which he states that comparison samples were not necessary given the overwhelming concentration of gasoline in the debris collected from the scene. Defendant may disagree with the decision to forgo comparison samples, and while this may be an appropriate cross-examination subject, this objection does not warrant exclusion of Robbins' testimony.

Third, defendant argues that Robbins made a presumption about the use of accelerants in the Bridges fire. Given that Robbins found containers of charcoal lighter fluid and smelled gasoline throughout the premises, one can hardly claim his conclusion about the use of an accelerant was based on an unfounded assumption.

Defendant's fourth argument—that Robbins improperly relied on irregular fire patterns—is also meritless. NFPA 921 states that irregular fire patterns may indicate the use of liquid accelerants, but that they cannot be exclusively relied on since they may form for other reasons. At no time did Robbins state that he relied exclusively on such patterns; to the contrary, he listed multiple reasons for concluding that liquid accelerants were used in the fire, including, most obviously, the actual finding of liquid accelerants on the premises.

In his fifth argument, defendant asserts that Robbins improperly relied on the appearance of a flash fire. According to the NFPA, when a fire reaches a "flashover" state, it can obscure

the origin of a fire because a momentary flash fire can spread through the structure. NFPA 921 § 6.3.7.11. Yet, Robbins concluded that the fire at Bridges did not reach a flashover state. Again, defendant's criticism in this regard may be explored in cross-examination, but Robbins' conclusions are not inadmissible on this basis.

In defendant's final argument, he asserts that Robbins was not objective in his investigation. Defendant offers two reasons for this assertion. First, defendant notes that Robbins only required a few hours to reach his conclusion. Second, defendant suggests that in his report, Robbins emphasized that the matchbooks found at Bridges came from a bail bondsman, despite the fact that the source of the matchbooks was irrelevant to the investigation. Both of these arguments, like defendant's other arguments, address the weight, not the admissibility, of Robbins' testimony.

In sum, none of defendant's arguments provides a basis to exclude Robbins' testimony. Robbins' investigation is the product of a reliable methodology applied reliably in light of his expert training and experience.

B. Testimony of Charles Kubilus

Charles Kubilus is a fingerprint specialist with the Bureau of Alcohol, Tobacco, Firearms, and Explosives ("ATF") Forensic Science Laboratory. He will testify that he examined the latent fingerprints and palmprints from Bridges and, with the exception of one palmprint, matched all the prints to defendant's known prints. Defendant contends both that the methods of fingerprint analysis are unreliable and that the methods were not reliably applied in this case.

Kubilus has significant experience in fingerprint analysis. For nine years, Kubilus worked at the Federal Bureau of Investigation ("FBI") as a fingerprint examiner. Following his time at the FBI, he served as a fingerprint specialist with the United States Secret Service for

four years. In 2006, he left the Secret Service for his current post at the ATF. Kubilus has completed a two-month course in fingerprint examination and collection at the FBI, and he serves as an instructor in processing and comparing fingerprints. He has been certified as a fingerprint specialist by the FBI, Secret Service, ATF, and the International Association for Identification. He is plainly a well-qualified fingerprint analyst.

Defendant first attacks the reliability of the methodology Kubilus followed, namely the well-known Analysis-Comparison-Evaluation-Verification (“ACE-V”) method for fingerprint identification. In his affidavit, Kubilus described each of the four steps in the ACE-V method: (i) analysis, (ii) comparison, (iii) evaluation, and (iv) verification.

The *analysis* phase relies on a “qualitative and quantitative” assessment of friction ridge detail at three levels of granularity: (i) ridge flow, which is the direction of the friction ridges; (ii) individual ridge examination, including bifurcations, ridge endings, and ridge dots; and (iii) poroscopy, which is the examination of pores. The first level of detail can be used to exclude, but not to identify, a print, while a combination of the second and third levels of detail may allow for either identification or exclusion. The latent print is analyzed first, followed by the known print. If either the latent or the known print is unsuitable for examination, the analysis ends.

The *comparison* phase involves side-by-side observation of friction ridge detail to determine if the details match in similarity, sequence, and spatial relationship. According to Kubilus, differences in the fingerprints do not necessarily end the analysis; rather, the examiner must determine whether the dissimilarity is explainable given pressure differences, surface texture, print medium (*e.g.*, ink, sweat, or blood), and other expected variations.

In his testimony, Kubilus stated that no set number of similarities—sometimes known as “points”—indicates a match, since it is both the quantity and quality of similarities that allow for identification. Likewise, the number of explained dissimilarities—that is, dissimilarities

believed to be the result of expected variations—is not dispositive either for or against finding a match.⁸

The third phase in the ACE-V method—*evaluation*—requires the examiner to form a conclusion about the prints. The examiner can conclude that the prints are a match (known as “individualization” or “identification”), that they are not a match (known as “exclusion”), or that the result is inconclusive. Both the comparison and evaluation phases involve the exercise of judgment by an examiner based on that examiner’s training and experience.

Following the evaluation phase is the fourth and final phase: *verification*. In the verification phase, a second examiner is provided the same prints and asked to check the work of the first examiner. Notably, the second examiner is aware of the first examiner’s conclusion. In Kubilus’s experience, only once has a verifying examiner ever disagreed with the finding of the first examiner.

To determine whether Kubilus’s testimony is admissible requires examining, first, the underlying method and, second, Kubilus’s application of that method in this case. The ACE-V method is not without criticism. Although fingerprint examination has been conducted for a century, the process still involves a measure of art as well as science. The Fourth Circuit has noted that while not “scientific law,” the principles underlying fingerprint examination “bear the imprimatur of a strong general acceptance, not only in the expert community, but in the courts as

⁸ Yet, according to Kubilus, a single *unexplained* dissimilarity will negate a match. This is so because if the dissimilarity cannot be explained by ordinary, expected variations, the only appropriate conclusion is that another individual made the print.

well.” *Crisp*, 324 F.3d at 268.⁹ But of course, a history of judicial and expert community acceptance does not obviate the government’s burden to demonstrate in this case reliability of the expert’s testimony under *Daubert*. The NRC Report devotes significant attention to friction ridge analysis, noting the “subjective” and “interpret[ive]” nature of such examination. NRC Report, at 139. Additionally, the examiner does not know, *a priori*, which areas of the print will be most relevant to the given analysis, and small twists or smudges in prints can significantly alter the points of comparison. This unpredictability can make it difficult to establish a clear framework with objective criteria for fingerprint examiners. And unlike DNA analysis, which has been subjected to population studies to demonstrate its precision, studies on friction ridge analysis to date have not yielded accurate population statistics. In other words, while some may assert that no two fingerprints are alike, the proposition is not easily susceptible to scientific validation. *Id.* at 139-40.¹⁰

⁹ In *Crisp*, the court did not hold that fingerprint analysis is admissible in all cases. Rather, the Fourth Circuit found that the district court did not abuse its discretion in admitting the testimony of the fingerprint examiner in light of the evidence and testimony presented by that examiner regarding the reliability of his methods. As the court noted:

[T]he district court heard testimony to the effect that the expert community has consistently vouched for the reliability of the fingerprinting identification technique over the course of decades. . . . The district court also heard evidence from which it was entitled to find the existence of professional standards controlling the technique’s operation. Those standards provide adequate assurance of consistency among fingerprint analyses. Finally, the court heard testimony that fingerprint identification has an exceedingly low rate of error, and the court was likewise within its discretion in crediting that evidence.

Crisp, 324 F.3d at 269. Although the *Crisp* opinion does not control the result in this case, the reasoning of *Crisp* is consistent with the result reached in this case.

¹⁰ While the proposition that all fingerprints are unique is impossible to prove across all human beings who have ever lived, studies of identical twins have shown that their fingerprints are dissimilar at all points in their lives. Since it is believed that, if anyone, identical twins would be most likely to have identical fingerprints, the lack of such similarity weighs in favor of the hypothesis that no two fingerprints are alike. See *United States v. Mitchell*, 365 F.3d 215, 236

Furthermore, while fingerprint experts sometimes use terms like “absolute” and “positive” to describe the confidence of their matches, the NRC has recognized that a zero-percent error rate is “not scientifically plausible.” *Id.* at 142. Kubilus has pointed out that some studies have demonstrated a high degree of accuracy in the work of fingerprint examiners, but the small sample sizes used in such studies diminish their persuasiveness. For example, a recent pilot study of the ACE-V process found no errors in any of the trials in which examiners found two prints to be a match.¹¹ But this study involved just six examiners in sixty ACE-V trials, and other studies have yet to test the accuracy of fingerprint examiners on a larger scale.¹²

Additionally, the steps in the ACE-V method raise concerns about scientific validity, not only because of the subjective nature of the analysis, but also the lack of “blind” verification. This is so because the second examiner in the verification phase generally knows the conclusion reached by the first examiner,¹³ which calls into question whether the verification may be biased. Yet, it is worth noting that the Langenberg pilot study examined this phenomenon and found that even after attempting to bias the examiners by stating that a prior examiner found a match where

(3d Cir. 2004) (discussing such studies).

¹¹ See Glenn Langenberg, *A Performance Study of the ACE-V Process: A Pilot Study to Measure the Accuracy, Precision, Reproducibility, Repeatability, and Biasability of Conclusions Resulting from the ACE-V Process*, 59 J. of Forensic Identification 219 (2008). Interestingly, the accuracy rate was much lower—approximately 67% in the Langenberg pilot study—for exclusions (*i.e.*, false negatives). That is, examiners are more likely to find incorrectly that a print is excluded than to conclude incorrectly that a print is a match. Of course, false positives are more likely to result in wrongful convictions than false negatives, making the former more problematic than the latter for the criminal justice system.

¹² For example, another pilot study found that, when presented fingerprints from the same source deposited at nearly the same time (known as “simultaneous impressions”), examiners accurately found a match 88% of the time. Yet, the study involved just thirty-one examiners each analyzing a set of thirty latent fingerprints. John P. Black, *Pilot Study: The Application of ACE-V to Simultaneous (Cluster) Impressions*, 56 J. of Forensic Identification 933 (2006).

¹³ An examiner’s conclusion that there is no match is not typically submitted for verification.

none existed, no examiner found the same pair of prints to be a match. That is, no examiner incorrectly verified a false-positive.¹⁴ Nevertheless, as stated previously, a study on the accuracy of friction ridge analysis has yet to be replicated on a large scale.

The absence of a known error rate, the lack of population studies, and the involvement of examiner judgment all raise important questions about the rigorousness of friction ridge analysis. To be sure, further testing and study would likely enhance the precision and reviewability of fingerprint examiners' work, the issues defendant raises concerning the ACE-V method are appropriate topics for cross-examination, not grounds for exclusion. Defendant's most significant criticism of the ACE-V method is that the process requires the exercise of judgment. Just as with fire investigation, the fact that ACE-V involves judgment does not render the method unreliable for *Daubert* purposes. *See United States v. Mitchell*, 365 F.3d 215, 241 (3d Cir. 2004) (finding that the subjective nature of fingerprint analysis weighs against, but does not bar, its admissibility under *Daubert*). As the Supreme Court has recognized, an expert's methodology may be admissible even though it "requires the exercise of judgment . . . that might be explored on cross-examination." *Melendez-Diaz v. Massachusetts*, — U.S. —, 129 S. Ct. 2527, 2537 (2009). A contrary rule would effectively exclude vast amounts of expert scientific testimony. Judgment is, and must be, ubiquitous in science. Indeed, experts across various fields routinely must rely on the exercise of judgment in their work, and this fact alone does not prevent them from offering reliable, admissible opinions in court.¹⁵

¹⁴ For the false-positive trials, experimenters used fingerprints that had been deemed close non-matches.

¹⁵ *See United States v. Law*, 528 F.3d 888, 912 (D.C. Cir. 2008) (affirming the admission of a forensic chemist's "qualitative identification" of drug residue despite the subjective judgment called for in such an opinion); *Foreman v. Am. Rd. Lines, Inc.*, 623 F. Supp. 2d 1327, 1334 (S.D. Ala. 2008) (finding the opinion of a clinical psychologist admissible despite the exercise of "clinical judgment" and the reliance on subjective patient interviews); *Vasquez-Ruiz*, 2002 U.S.

Furthermore, it can hardly be questioned that the ACE-V method has achieved widespread acceptance in the fingerprint examination community. The Scientific Working Group on Friction Ridge Analysis, Study and Technology (“SWGFAST”), which is composed of fingerprint specialists from numerous local, state, and federal law enforcement agencies, has established standards for fingerprint analysis for more than fifteen years. SWGFAST has supported ACE-V and published standards governing its application.¹⁶ According to Kubilus, SWGFAST has consistently concluded that there is no scientific basis for a predetermined number of points of ridge similarity to warrant an identification. In sum, the ACE-V method, although perhaps not worthy of the pedestal on which it has been historically placed, is sufficiently reliable to overcome *Daubert*’s bar to admissibility.

As to Kubilus’s application of the ACE-V method, his testimony and reports make clear that he applied the ACE-V method reliably to the prints in this case. Kubilus examined two latent fingerprints and six latent palmprints recovered from Bridges. He found that both fingerprints and five of the six palmprints matched defendant’s known prints, and each of these conclusions was verified by a second examiner. Kubilus identified between eleven and seventeen points of similarities in each print. As to the sixth palmprint, Kubilus stated that the print lacked sufficient clarity and completeness to allow for identification, and as such, the evaluation of that print was deemed inconclusive.

Dist. LEXIS 1665, at *12-13 (noting that the use of judgment in medical diagnosis does not render a diagnosis unreliable under *Daubert*).

¹⁶ See, e.g., “Standard for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACE-V) (Latent),” SWGFAST (Feb. 12, 2010), *available at* http://www.swgfast.org/documents/documentation/100310_Standard_Documentation_ACE-V_1.0.pdf.

Because the ACE-V method is based on sufficiently reliable principles and methods, and because those principles and methods were reliably applied in this case by an expert with sufficient knowledge, skill, training, and experience, Kubilus's testimony passes muster under Rule 702, Fed. R. Evid., and *Daubert*.

C. Testimony of Andrew Hawkins

The final expert challenged by defendant is Andrew Hawkins, a forensic scientist with the ATF's Explosives Forensic Science Laboratory. Hawkins examined material recovered from Bridges, including part of defendant's clothing, to identify possible chemical residue from ignitable fluids. His examination required the use of gas chromatography/mass spectrometry ("GC/MS"), a technique that separates the components in a mixture and identifies the chemicals based on their mass spectrum. This technique has been widely recognized as sufficiently reliable to pass muster under *Daubert*. See *United States v. Vitek Supply Corp.*, 144 F.3d 476, 485-86 (7th Cir. 1998) (finding that GC/MS is "widely used and generally accepted in the fields of analytical and forensic chemistry"); see also *United States v. Law*, 528 F.3d 888, 912 (D.C. Cir. 2008) (recognizing the scientific reliability of GC/MS). Hawkins employed GC/MS in this case and found the presence of gasoline in much of the physical evidence collected from the scene of the fire.

Defendant does not contest that GC/MS is based on reliable principles and methods; rather, defendant claims that Hawkins failed to apply the method reliably in this case. In particular, defendant claims that Hawkins failed to examine comparison samples from Bridges as a part of his analysis. As discussed *supra*, NFPA 921 recommends that a fire investigator collect comparison samples from a fire scene, but as Hawkins notes in his affidavit, comparison samples are not always necessary. See NFPA 921 § 16.5.4 (leaving the decision whether to collect samples to the discretion of the laboratory analyst). Indeed, they were not necessary in this case.

According to Hawkins, while many materials are derived from petroleum products, the burning and decomposition of these materials would not show the presence of gasoline in as high concentrations as Hawkins found in the evidence collected from Bridges. Additionally, Bridges had no use for lighter fluid, yet lighter fluid and containers of lighter fluid were found in many locations in Bridges at the time of the fire. Finally, fire officials noted a strong odor of gasoline at the scene. All of these facts support Hawkins' decision not to use comparison samples in this case. Further questions about Hawkins' decision in this regard may be appropriate for cross-examination, but the testimony need not be excluded on this basis. In sum, both Hawkins' method and his application of that method are sufficiently reliable under Rule 702, Fed. R. Evid., and *Daubert*.

IV.

Accordingly, defendant's motion to exclude the testimony of Robbins, Kubilus, and Hawkins must be denied. The government has demonstrated that the testimony of all three experts reflects the use and application of reliable principles and methods in their respective fields, as required under Rule 702, Fed. R. Evid., and *Daubert*.

An appropriate Order will issue.

Alexandria, Virginia
October 18, 2010

/s/
T. S. Ellis, III
United States District Judge